Laboratory Studies in Applied Microbiology

Advanced Laboratory – BIOC 318

Welcome page

Background

- Local info
- Water issues
- Projects
- Characterization
- Sample article (pdf)
- How to use Bergey's Manuals

Methods

- Rules
- Media/culture
- Aseptic technique
- Staining/interpretation
- Isolation strategies
- Assays/characterization
- Microscopy
- Cultural characteristics

Media preparation and training

- Training sessions
- Media preparation
- Laboratory safety and conduct

Experimental Biosciences Resources

Fall semester 2014 syllabus

Welcome to my laboratory course in microbiology, which is offered the second half of each semester, with one section in fall and two sections in spring. This course will have you working in teams on two projects, one to conduct a microbiological analysis of water from a hypothetical system of lakes and a second in which you will characterize bacterial species that you isolate from locally collected samples. Most of the work will be self-scheduled and self-paced, however we must have several scheduled meetings, so please look over the detailed schedule posted below and arrange your schedule so that you can attend.

Instructor and office hours

Your instructors in the Dept. of Biosciences are:

David Caprette, Professor in the Practice
ABL 327 – third floor Anderson Biological laboratory Building
caprette@rice.edu
713-348-3498 (campus extension 3498)
Office hours TBD

Charles Stewart, Professor of Biochemistry
GBH W104
crs@rice.edu
713-348-4926 (campus extension 4926)
Office hours TBD

Preparing for the course

Bioc 211, Intermediate Experimental Biosciences, is a prerequisite for this course and Bioc 311, Advanced Experimental Biosciences, is highly recommended for its emphasis on teamwork, time management, writing, and quantitative skills.

Side menu

Adequate preparation is essential. Before we begin the laboratory work please look over the information under Background. The four background pages on the local community, water issues, projects, and characterizing isolates provide the rationale behind the projects and place the studies in context. You will be consulting Bergey's manuals and the methods manual as you work with your bacterial isolates. The content of training sessions and information on preparing media for the projects can be found under Media preparation and training, and I've included a convenient link to our Experimental Biosciences Resources in case you want to review how to keep a laboratory record, recommendations for technical writing, etc.

Laboratory notebook

Each individual will maintain a laboratory notebook, to be kept in the laboratory at all times. The notebook is to be maintained according to academic standards, with numbered, dated pages, up-to-date table of contents, legible, well organized entries, etc., as taught in experimental biosciences (Bios 111, 211, and 311). Record your own individual activities and observations so that your lab record reflects your personal contribution to the projects.

You are welcome to start with a partly filled notebook from another course, even one obtained from another student. New notebooks can be purchased from the campus store or, for a MUCH better price, ordered directly from the distributor. Please purchase a Hayden-McNeil Carbonless TOP Permanent Lab Notebook, 50 Set or 100 Set, from WH Freeman (url below).

http://whfreeman.com/Catalog/product/hayden-mcneilcarbonlessspirallabnotebook%28100set%29-firstedition-hayden-mcneil/formatsandpackages/studentpurchaseoptions

Bergey's manual

Each team will need one or two copies of Bergey's Manual of Determinative Bacteriology, 1994 or 2000 edition (they are the same), for use in identifying unknown bacteria. Here are recommended options for you:

- Each team may borrow up to two volumes from the laboratory. A $50 cash deposit will be required per volume. Your deposit will be returned provided there are no additional marks on the pages and the book is returned in its

original condition, minus normal wear and tear. See "How to use Bergey's Manuals" for suggestions on how to use the tables without marking on them.
- You are welcome to purchase a copy yourself (recommended if you feel compelled to write in the book). A typical retail price is around $120, however there are bargains out there, including new Manuals for under $80 and used ones in good condition for less than $50. Make sure that you purchase the 1994 or 2000 edition.

Scheduled meetings

Event	Section 001	Section 002
Introductory presentation	Weds Oct 15, 3-3:50 pm, ABL 123	Thurs Oct 16, 3-3:50 pm, ABL 123
Lab tour and session on media preparation	Mon Oct 20, 1-4 pm, ABL 141 (two sessions each assigned by team #)	Tues Oct 21, 1-4 pm, ABL 141 (two sessions each assigned by team #)
Prepare tubes for MTF, training ssession in aseptic technique, culture methods, and Gram staining	Weds Oct 22, 1-5 pm, ABL 141 Split sessions assigned by team	Thurs Oct 23, 1-5 pm, ABL 141 Split sessions assigned by team
Process water samples for MTF, review and training in microscopy, incl. oil immersion	Mon Oct 27, 1-5 pm, ABL 141 Microscopy sessions assigned by team	Tues Oct 28, 1-5 pm, ABL 141 Microscopy sessions assigned by team
Teams follow up the MTF samples, prepare R2A and TS agar plates	Weds Oct 29, afternoon, ABL 141	Thurs Oct 30, afternoon, ABL 141
Continue following up the water analysis	Self-scheduled, as needed to complete the project	Self-scheduled, as needed to complete the project
Process water samples for plate counts and isolates	Mon Nov 3, 1 pm to approx 3 pm, ABL 141	Tues Nov 4, 1 pm to approx 3 pm, ABL 141
Obtain and characterize isolates	Self-scheduled, as needed to complete the project	Self-scheduled, as needed to complete the project
Presentation on isolating, characterizing species	Weds Nov 5, 3-3:50 pm, ABL 123	Thurs Nov 6, 3-3:50 pm, ABL 123
Presentation on preparing effective posters	Mon Nov 10, 2:30 pm, location TBA	Tues Nov 11, 2:30 pm, location TBA
Poster sessions	Mon Nov 24, starting 1 pm, location TBA	Tues Nov 25, starting 1 pm, location TBA

In addition to the scheduled sessions during the first full week of the course, individual teams must set time aside to prepare and sterilize media for the water analysis project.

Poster presentation

Each team will prepare a poster on the water analysis project (not the characterization) and give a ten minute presentation. A team may select one individual to present the work or choose a panel type presentation. The poster should cover the rationale, all findings, data interpretation, and recommendations that address the entire scope of the project.

Species characterization

Each team will obtain as many unique isolates as they can find and divide them among team members for characterization. Each individual should attempt to identify his/her isolates down to species level and then select ONE isolate of interest to write up in a *Compendium* entry as described in the accompanying document (Characterization). Although only one isolate is to be written up, you are strongly advised to attempt characterization of more than one in case you lose a culture or run into a dead end.

Performance evaluations

We will conduct self and peer evaluations using the Comnprehensive Assessment of Team-Member Effectiveness (CATME), developed at Purdue University. Each intern is to review his/her own performance (self evaluation) and performance of other individuals on the team. Preliminary evaluations will be due a few weeks into the course and final self- and peer evaluations must be submitted by the final due date. These evaluations are critically important, therefore I need you to give them a lot of thought and I need you to be completely objective, frank, and honest. An unrealistic evaluation of self and/or peers defeats the purpose of the assessment and will have a negative impact on the evaluator's own final grade. Unrealistic can mean either overly critical or insufficiently critical.

Course grade

In addition to feedback received during the course, each student will receive a complete course grade breakdown at the time that final grades are submitted.

1. Team poster - 30%
2. Individual notebook - 20%
3. Individually written paper - 50%
4. "Performance factor" - see below

"Performance factor"

The CATME evaluation tool identifies high and low performing team members. For high performers, items 1-3 will count for 70% of the course grade and an A for performance will make up the rest (30%) of the calculation. For students identified as low performers the CATME score will be used as a multiplier on the team poster grade. For example, a B+ on a poster is recorded as a 90. A student on the team with a 70% CATME score will receive 0.7 x 90 = 63 for the poster grade. Please note that in a typical lab section only one or a few students are likely to be identified as high or low performers.

Each team is held accountable for responsible use of the microscopes, disposal of culture materials, and for cleaning up reusable supplies and the bench area. If these responsibilities are disregarded then each team member will lose 1/3 letter grade in addition to any other adjustment for laboratory performance.

Additional policies

- Absences from scheduled meetings will be excused for the usual reasons, e.g., illness or family emergency
- Absences due to circumstances within a student's control (e.g., forgetting to show up or travel for interviews) cannot be excused and will be reflected in the performance grade; *Exception* – attending the presentation on preparing effective posters is highly recommended but optional
- All participants must engage in safe laboratory practices and abide by specific "rules" set down for this course
- An assignment that is submitted late will lose 10% per day including holidays and weekends

Honor code

As with all biosciences courses, the Rice University Honor Code applies to all personal conduct and assignments. Compliance with the honor code includes providing honest evaluations of yourself and your teammates.

Students with disabilities

Any student with a disability needing academic adjustments or accommodations should contact me (x3498 or caprette@rice.edu) as soon as possible and also contact Disabled Student Services in the Ley Student Center.

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Created by David R. Caprette (caprette@rice.edu), Rice University 24 May 00
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